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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/827,513	04/19/2004	In-Sung Kim	8021-219 (SS-19521-US)	3462
22150 7590 09/27/2007 F. CHAU & ASSOCIATES, LLC 130 WOODBURY ROAD WOODBURY, NY 11797			EXAMINER YOUNG, CHRISTOPHER G	
			ART UNIT 1756	PAPER NUMBER
			MAIL DATE 09/27/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/827,513

Applicant(s)

KIM ET AL.

Examiner

Christopher G. Young

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-51 is/are pending in the application.
- 4a) Of the above claim(s) 14-49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13, 50 and 51 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-51 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1 page.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

2. The information disclosure statement (IDS) has been considered by the examiner.

### ***Election/Restrictions***

3. Applicant's election with traverse of claims 1-13 and 50-51 in the reply filed on September 10, 2007 is acknowledged. The traversal is on the ground(s) that simultaneous examination would not present an undue burden. This is not found persuasive because the claims of the method invention require a search that is not required by the stencil mask claims. Additionally, the method claims would require search and consideration of method embodiments that are not present in the mask claims.

The requirement is still deemed proper and is therefore made FINAL.

4. Claims 14-49 stand withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on September 10, 2007.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

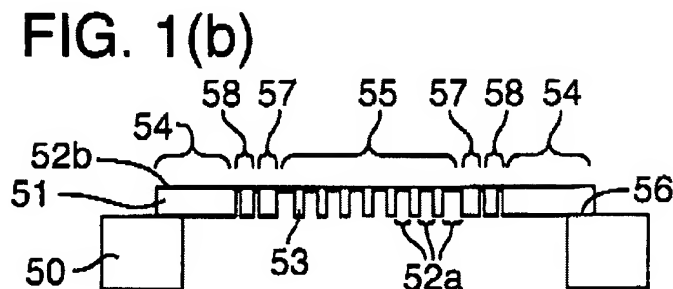
A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-13 and 50-51 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki, US Patent Number 6,459,090.

Suzuki anticipates the claims of the instant application. Suzuki teaches reticles for charged-particle-beam microlithography that exhibit reduced warp at pattern-defining regions. The Examiner has reproduced a few passages from the reference that best establish the anticipatory teachings. Claim 1 of the patent is representative of the teachings. It states: A reticle for charged-particle-beam (CPB) microlithography, comprising a reticle portion, the reticle portion comprising: a pattern-defining region comprising multiple subfields separated from one another by support struts, in which struts no pattern elements are defined, and each subfield defining a respective portion of a pattern defined by the reticle; an inner supporting part peripherally attached to the pattern-defining region, the inner supporting part being configured so as to integrally support the pattern-defining region; and an outer supporting part surrounding the inner supporting part and being connected to the inner supporting part by multiple connecting structures each having a spring characteristic, the outer supporting part being configured so as to peripherally support the inner supporting part and pattern-defining region.

Figure 1(b) shows the reticle of the prior art, including a border area, main strut areas, and auxiliary struts as claimed.



The passages describing the invention as represented by the Drawings are also very informative in rendering the claimed invention anticipated. See Figures 2(a) through 2(j). The reticle 49 can be fabricated using semiconductor-fabrication technology. FIGS. 2(a)-2(j) schematically depict the results of certain respective steps in a fabrication process for making the reticle 49. In a first step (FIG. 2(a)), a silicon-on-oxide (SOI) reticle substrate 60 is prepared. By way of example, the reticle substrate 60 has an outer diameter of 8 inches and a thickness of 725  $\mu\text{m}$ . The reticle substrate 60 includes a base layer 60c, a silicon oxide layer 60b, and a silicon layer 60a. The silicon layer 60a has a thickness of approximately 2  $\mu\text{m}$  and normally comprises doped silicon. The silicon oxide layer 60b has a thickness of approximately 1  $\mu\text{m}$  and serves as an intermediate layer. The base layer, 60c is made of silicon. A layer 61 of an organic resist is formed on the reverse side of the base, layer 60c (FIG. 2(b)), followed by patterning of the resist 61 (FIG. 2(c)). Material of the base layer 60c is removed selectively by dry etching, in the depth wise direction, from the regions unprotected by the resist 61 (FIG. 2(d)). In other words, the patterned resist 61 serves as an etching mask. As shown in FIG. 2(d), depth wise etching stops automatically at the silicon oxide layer 60b. The dry etching defines subfields 62, support struts

Art Unit: 1756

65, and the inner supporting part 63. Next, the remaining resist 61 is removed (FIG. 2(e)), and the exposed regions of the silicon oxide 60b are removed (FIG. 2(f)) using hydrogen fluoride or other suitable reagent. Thus, the silicon layer 60a becomes a reticle membrane. Next, a layer of an organic resist 66 is coated on the upper surface of the SOI substrate 60 (specifically on the upper surface of the silicon layer 60a, FIG. 2(g)), and a desired stencil pattern is imprinted in the resist 66 (FIG. 2(h)). Using the remaining resist 66 as an etching mask, a reticle stencil pattern 67 is formed in the silicon layer 60a, and the remaining resist 66 is removed (FIG. 2(i)). Finally, a peripheral frame 68, made of a material such as silicon, ceramic, or glass, is attached peripherally to the stencil-reticle portion (FIG. 2(j)), desirably using an adhesive, or by anodic welding or eutectic welding.

In the method of FIGS. 2(a)-2(j), connecting structures (see item 58 in FIG. 1(a)) can be formed at the same time as the support struts 65. Alternatively, the connecting structures 58 can be formed independently of the struts 65. Also, the connecting structures 58 can be formed so as to be surrounded by thin membrane regions as shown in FIG. 1(b), or to be surrounded by through-holes (represented by regions 75a and 75b in FIG. 3(a)).

In a CPB microlithographic reticle fabricated as described above, attachment of the peripheral frame 50 (FIG. 1(a)) to the outer supporting part 54 can generate a warp that is transmitted to the inner supporting part 57 and the pattern-defining region 55. To achieve a substantial reduction (e.g., ten-fold) in warp transmitted to the pattern-defining region 55 each connecting structure 58 desirably is configured to have a spring constant that is approximately one tenth the spring constant of the combined inner supporting part 57 and pattern-defining region 55.

For example, consider a warp of 100 nm arising by connecting the peripheral frame 50 to the stencil-reticle portion 51. This warp at the pattern-defining region 55 can be reduced to 10 nm by using a reticle 49 configured according to this embodiment. More specifically, the spring constant of a connecting structure 58 can be defined from the size of the pattern-defining region 55, the number of support struts 53, the width of each support strut 53, and the spacing between the support struts 53. In general, the stated 10-fold reduction in warp transmission to the pattern-defining region 55 is achieved by employing at least ten to less than 20 connecting structures 58, each having a spring constant of about 1 N/.mu.m between the inner supporting part 57 and the outer supporting part 54. More accurately, if the in-plane elastic constant of the stencil-reticle portion 51 is denoted as  $K_{sub.s}$ , the connection-relaxation coefficient is denoted as  $\beta$ , and the spring constant of the connecting structure 58 is denoted as  $K_{sub.f}$ , then the number "n" of connecting structures 58 and their spring constants can be configured to satisfy the relation:  $nK_{sub.f} = K_{sub.s} / \beta$ .

### *Conclusion*

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher G. Young whose telephone number is 571-272-1394. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1756

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Christopher G. Young  
Primary Examiner  
Art Unit 1756

cgy